

3D Printing in Zero-G Experiment, In Space Manufacturing (LPS, 4)

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The 3D Printing in Zero-G Experiment has been an ongoing effort for several years. In June 2014 the technology demonstration 3D printer was launched to the International Space Station. In November 2014 the first 21 parts were manufactured in orbit marking the beginning of a paradigm shift that will allow astronauts to be more self-sufficient and pave the way to larger scale orbital manufacturing. Prior to launch the 21 parts were built on the ground with the flight unit with the same feedstock. These ground control samples are to be tested alongside the flight samples in order to determine if there is a measurable difference between parts built on the ground vs. parts built in space. As of this writing, testing has not yet commenced. Tests to be performed are structured light scanning for volume and geometric discrepancies, CT scanning for density measurement, destructive testing of mechanical samples, and SEM analysis for inter-laminar adhesion discrepancies. Additionally, an ABS material characterization was performed on mechanical samples built from the same CAD files as the flight and ground samples on different machine / feedstock combinations. The purpose of this testing was two-fold: first to obtain mechanical data in order to have a baseline comparison for the flight and ground samples and second to ascertain if there is a measurable difference between machines and feedstock.